

Notice of Allowability

Application No.

10/809,728

Examiner

Mark Ruthkosky

Applicant(s)

MUTHUSWAMY ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 5/12/2006.
2. ☒ The allowed claim(s) is/are 1 4 5.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
 - * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

DETAILED ACTION

Response to Amendment

Following a first office action on the merits, applicant has submitted a response that amends claim 1 and cancels claims 2-3.

Claim Rejections - 35 USC § 102

The rejection of claims 1, 2 and 4-5 under 35 U.S.C. 102(b) as being anticipated by Lussey et al. (US 6,495,069) has been overcome by applicant's amendment.

Allowable Subject Matter

Claims 1 and 4-5 are allowed.

The instant claims are to a method of operating a fuel cell, comprising the steps of activating a membrane electrode assembly by supplying reactants to the membrane electrode assembly; and selectively limiting amount of electrons collected from localized areas of the membrane electrode assembly surface by utilizing a porous, Z-axis electrically conductive, non-linear positive temperature coefficient material disposed on a side of the membrane electrode assembly. The prior art does not teach a method of selectively limiting an amount of electrons collected from localized areas of the membrane electrode assembly surface by utilizing a porous, Z-axis, electrically conductive, non-linear positive temperature coefficient material disposed on a side of a membrane electrode assembly. Z-axis electrically conductive, non-linear positive

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temperature coefficient materials are known in the prior art, for example, as taught in Hall (US 5,880,668) and Barma et al. (US 5,106,538.)

Lussey et al. (US 6,495,069) teaches an electrically conductive, non-linear positive temperature coefficient polymer material of interest in the design of fuel cells (col. 7, lines 51-end.) The polymer composite that has a low electrical resistance that switches to a high resistance state in response to heat and current (col. 8, lines 1-25.) The polymer taught in the reference is a z-axis conductive material. The increased resistance is due to the expansion of the polymer upon heating (col. 7, line 50-col. 8, line 8.) The material changes from a first resistivity to a more restive state when a change, such as in the temperature, occurs (col. 1, lines 35-end.) The polymer material must at least be in electrical contact with the MEA in order to perform the function described in Lussey. The reference does not teach a method of selectively limiting an amount of electrons collected from localized areas of the membrane electrode assembly surface by utilizing a porous, Z-axis, electrically conductive, non-linear positive temperature coefficient material disposed on a side of a membrane electrode assembly.

The prior art further includes the teachings of Debe et al. (US 5,910,378), which teaches a fuel cell including a membrane electrode assembly including an electrically conductive material located adjacent to the electrodes of a membrane electrode assembly. The material is conductive but is not taught to be a positive temperature coefficient material, as described on pages 6-8 of the specification. The prior art reference does not teach a process of selectively limiting amount of electrons collected from localized areas of the membrane electrode assembly surface by utilizing a porous, Z-axis electrically conductive, non-linear positive temperature coefficient material disposed on a side of the membrane electrode assembly or that the resistance

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along the Z-axis will return to its previous level as noted in the specification for a positive temperature coefficient material.

As the prior art does not teach a method of operating a fuel cell comprising the steps of 1) activating a membrane electrode assembly by supplying reactants to the membrane electrode assembly; and 2) selectively limiting amount of electrons collected from localized areas of the membrane electrode assembly surface by utilizing a porous, Z-axis electrically conductive, non-linear positive temperature coefficient material disposed on a side of the membrane electrode assembly, the claims are allowed.

Examiner Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR


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system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free.)

Mark Ruthkosky

Primary Patent Examiner

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7/20/2006